Title of Lesson: Radian and Degree Measure
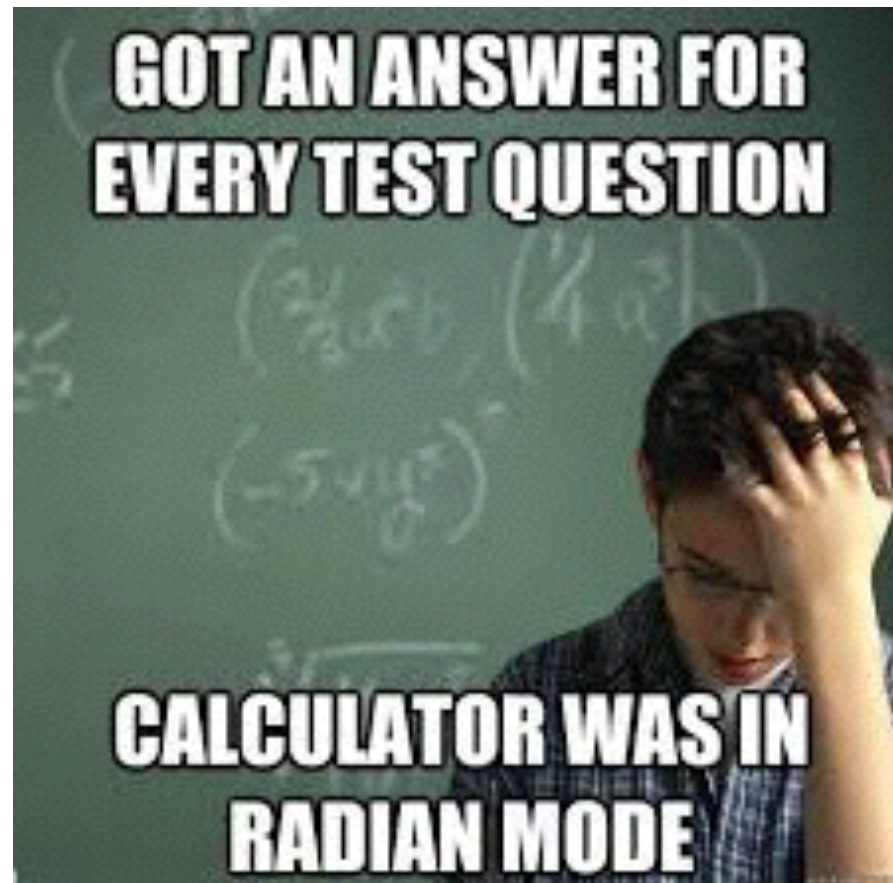
By the end of this lesson, I will be able to answer the following questions…

1. What is a radian? How does it relate to degrees?

2. What are Linear and Angular Speed and how do I calculate them?

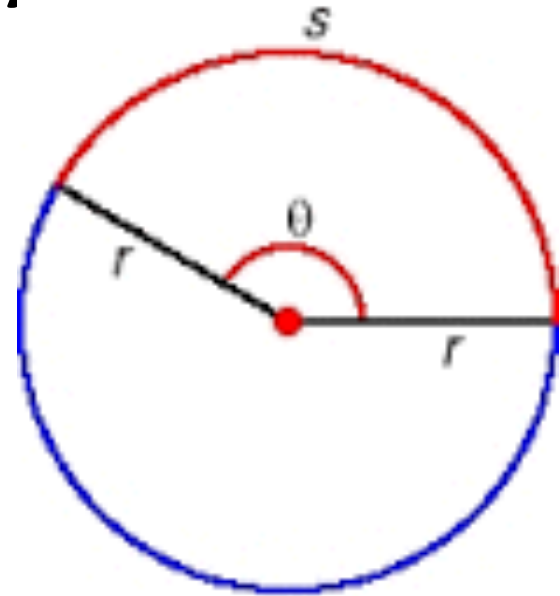3. What is Arc Length and Sector Area and how do I calculate them?

Vocabulary

1. Arc Length: The distance along
the curved line making up an arc.
Usually represented as "s."

2. Central Angle: An angle whose vertex
 is on the center of the angle.

3. Supplementary Angles: Add to 180 degrees.

4. Complementary Angles: Add to 90 degrees.
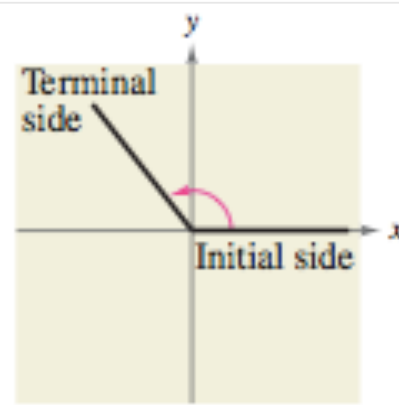
Prerequisite Skills with Practice

$$\frac{\pi}{3} - \frac{\pi}{4} =$$

Radians on graphing calcs.

$$-\frac{\pi}{3} - \frac{\pi}{4} =$$

$$\frac{11\pi}{3} - \frac{3\pi}{4} =$$

Some more vocabulary better served with pictures.

Terminal side

Initial side

Angle in standard position

Positive angle (counterclockwise)
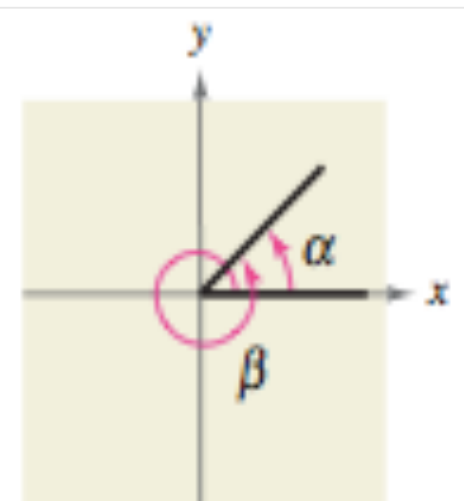
Negative angle (clockwise)

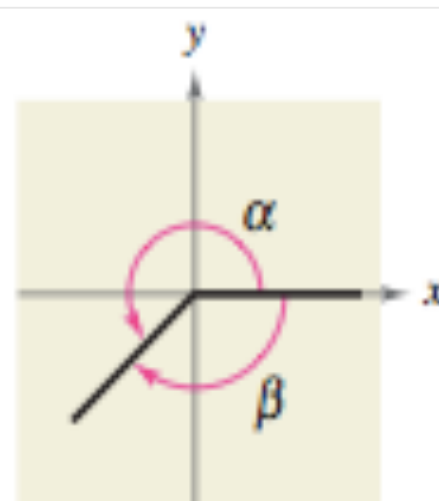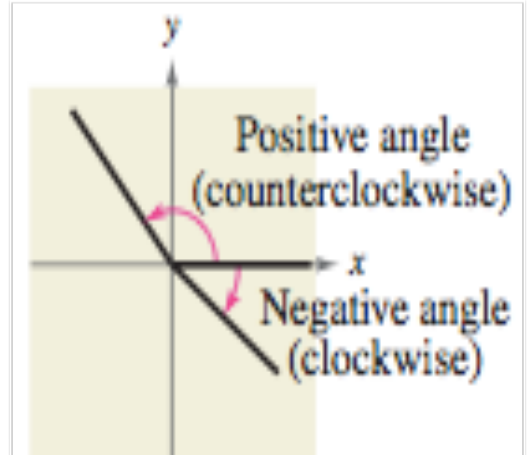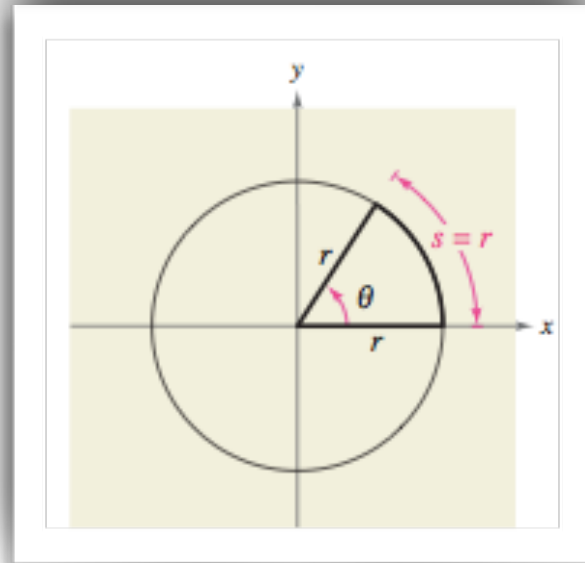α

β

α

β

FIGURE 4.4 Coterminal angles

What is a Radian?
One Radian is the measure of a central angle...

$$\theta$$

...that intercepts an arc "s" equal in length to the radius of the circle

Therefore - How how many radians are in a circle with a radius of 1?

Converting Degrees to Radian and Radians to Degrees.

$$\frac{\theta_d}{360} = \frac{\theta_r}{2\pi}$$

Convert to Radians

$$135^o \rightarrow$$

$$-60^o \rightarrow$$

$$15^o \rightarrow$$

Convert to Degree

$$\frac{4\pi}{3} \rightarrow$$

$$-3\pi \rightarrow$$

$$\frac{5\pi}{8} \rightarrow$$

Degrees, Minutes and Seconds
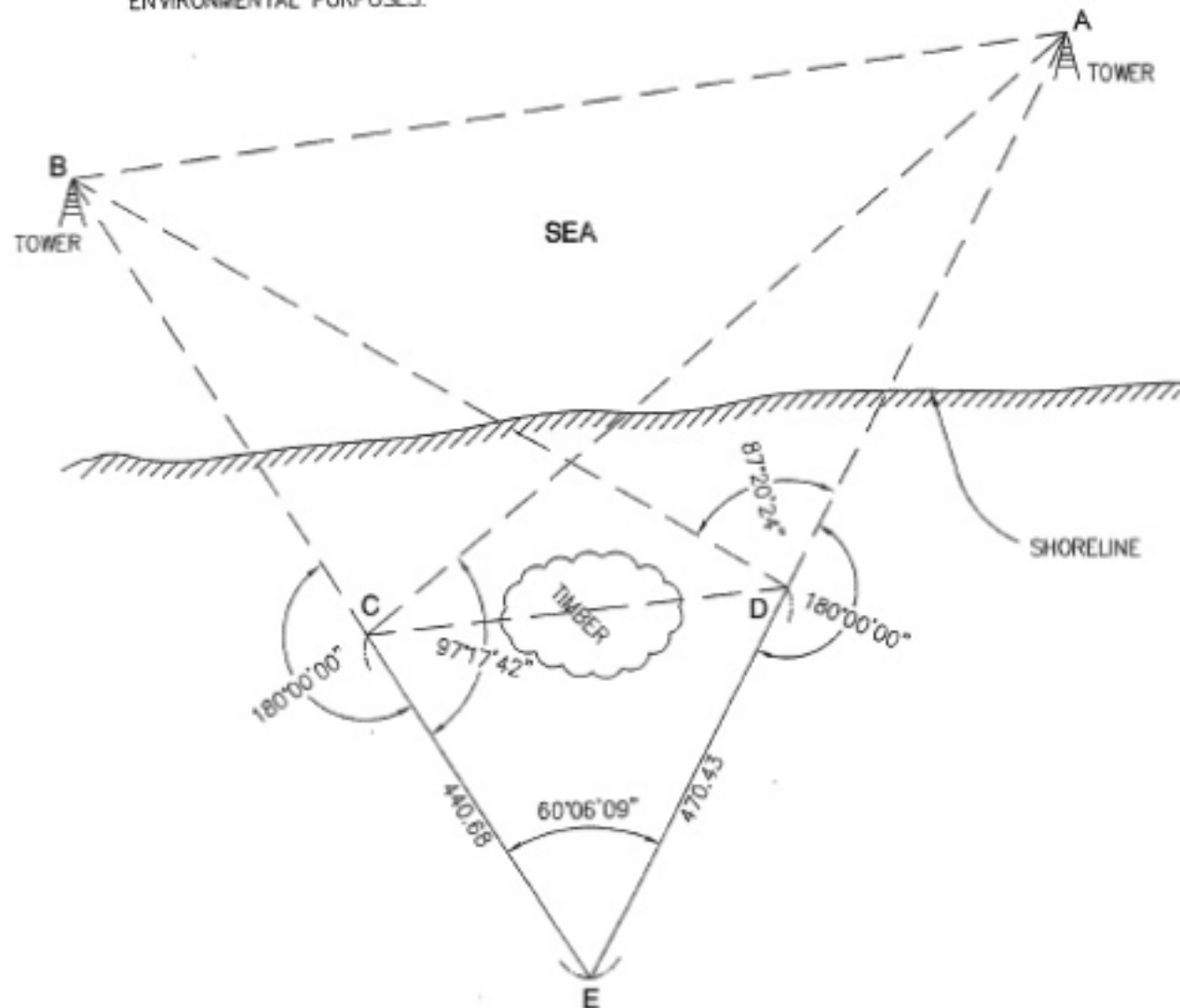
Calculator needed!

Where are they typically used?

Degrees^o Minutes' Seconds"
D^o M' S"

$112.39^o \rightarrow$

$43^o\ 12'\ 52" \rightarrow$

THE GOVERNMENT HAS CONSTRUCTED OFFSHORE COMMUNICATION TOWERS TO HELP
MONITOR THE COASTAL WATERS. A FIBER OPTIC CABLE NEEDS TO BE CONNECTED FROM
THE POINTS ON LAND TO THE TOWERS FOR INCREASED SECURITY. THIS CABLE WILL
ENABLE THE TOWERS TO TRANSMIT MORE INFORMATION QUICKER, FOR SURVEILANCE AND
ENVIRONMENTAL PURPOSES.

A
TOWER

B
TOWER

SEA

SHORELINE

87°20'24"

C

D

180°00'00"

TIMBER

97°17'42"

180°00'00"

440.68

470.43

60°06'09"

E

Find Arc Length or Sector Area.

$$\frac{\theta_d}{360} = \frac{\theta_r}{2\pi} = \frac{s}{2\pi r} = \frac{A_{sec}}{\pi r^2}$$

s

$\theta = 240°$

$r = 4$
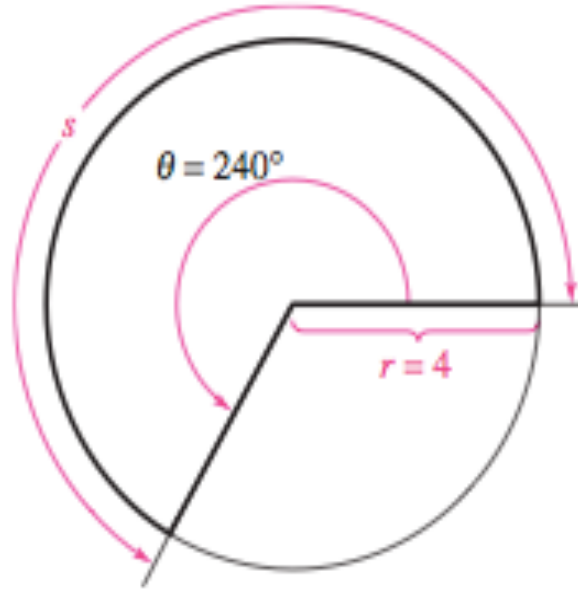
Angular and Linear Speed

The radius of each wheel of the car is 15 inches. If the wheels are turning at a rate of 3 revolutions per second, how fast is the car moving? Express your answer in inches per second and miles per hour.

Next, find the angular speed of the wheel in degrees per second AND radian per second.
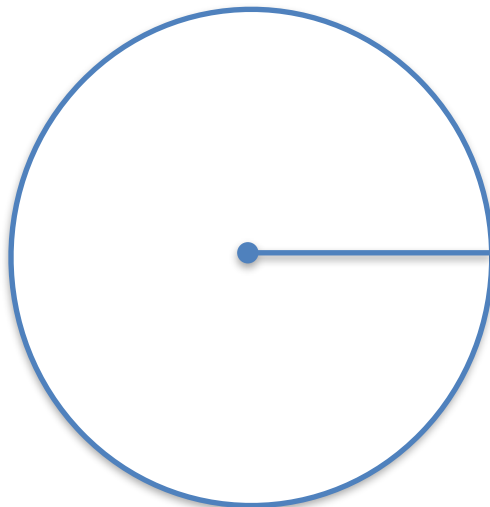
THE END

Visit PlottsMath for assignment details